

WHAT IS CLAIMED IS:

1. A pulse laser assisted machining method comprising a fine machining process, said fine machining process comprising the following steps of:

5 (a)focusing a laser beam in such a manner that a focal point is located on a workpiece, and that the focal point is separated from a front of the blade of a machining tool by a microdistance;

(b) moving the workpiece and the machining tool in
10 relation to each other;

(c)softening a focused area by an instantaneous laser heating;

(d)advancing the machining tool such that the machined material and the softened material are removed
15 together, and that the same machining mechanism is repeated until a subsequent laser emission.

2. The method as defined in claim 1, wherein the laser beam is brought into focus such that the focal point is separated from the front of the blade of the machining tool by a distance
20 ranging from several μm to more than $10\ \mu\text{m}$.

3. The method as defined in claim 1, wherein each pulse time of the laser is measured in unit of microsecond or nanosecond.

4. The method as defined in claim 1, wherein the focal
25 heating range of the laser has a width of several μm to more than

10 μm , and a length of more than 10 μm to several hundred μm .

5. A laser assisted machining device comprising:

a tool mount;

a machining tool mounted on a tool mount;

5 a laser head mounted on the tool mount such that
the laser beam of the laser head can be focused on a workpiece
for instantaneously heating and softening the workpiece;

a chip spray mounted on the tool mount for removing
chip by a high-pressure fluid emission.

10 6. The device as defined in claim 5, wherein the laser
head emits pulsed or continuous laser beam.

7. The device as defined in claim 5, wherein the chip
spray removes the chip by a high-pressure gas or liquid.

8. A laser assisted machining device comprising:

15 a tool mount;

a machining tool mounted on the tool mount;

a laser head mounted on the tool mount such that
the laser beam of the laser head can be focused on a workpiece
for instantaneously heating and softening the workpiece;

20 a chip spray mounted on the tool mount for removing
chip by a high-pressure fluid emission;

a digital thermometer disposed in a handle of the
machining tool or on the tool mount for monitoring the
temperature of a tool tip of the machining tool; and

25 a system controller for receiving data of the tool tip

temperature so as to control automatically laser.

9. The device as defined in claim 8, wherein the chip spray removes the chip by a high-pressure gas or liquid..

10. The device as defined in claim 8, wherein the laser
5 head emits pulsed or continuous laser beam.

11. The device as defined in claim 8, wherein the digital thermometer is a thermocouple or infrared digital thermometer.

10

15

20

25